INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 11, Issue 4, (2021) E-ISSN: 2222-6990

Sustainable Food Processing Instrument (i-KProM) among Technical and Vocational Education Training (TVET) Students

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v11-i4/9713 DOI:10.6007/IJARBSS/v11-i4/9713

Published Date: 22 April 2021

Abstract

The depletion of natural resources and increasing food consumption together with their food waste showing the urge to practice the sustainable food processing. The instrument of sustainable food processing (i-KProM) questionnaire was used to determine the right practices constructs for TVET students' in sustainable food processing and the related predictive factor. This study was conducted in TVET institutional in Perak which offering the Certification of Food Processing and Quality Control. An Exploratory Factor Analysis (EFA) for validity test and reliability test was used to measure the instrument and give an empirical verification of the construct validity and reliability of the questionnaire. Literature search and pilot study within the population were carried out and appropriate item was extracted. Initially, 37 items developed for sustainable food processing practices, however, only 23 items were remaining as an item investigate and 14 items found as not sufficient as required for EFA. For an independent variable of the research, 36 items remain which include five factors extracted. The sustainable food processing instrument (i-KProM) have been approved to have sufficient validity and reliability.

Keywords: Sustainable Food Processing, Exploratory Factor Analysis, Technical and Vocational Training.

Introduction

Technical and vocational education and training are an education towards decent jobs and occupation (UNESCO, 2016). Incheon Declaration 2015 has specified target in technical and vocational education training (TVET) to achieve 4th Sustainable Development Goal, which ensure women and men get equal access, affordable and quality of TVET in tertiary education including in universities (Sustainable Development Goals, SDG, 2030). This tertiary education plays the vital role for increasing the mobility of trainer and learners to enhance an academic credentials.

In supporting tertiary education of TVET, The Eleventh Malaysia Plan 2016-2020 projected that 60% of future job require TVET related skill to lead the country economic growth. To ensure the success of the projection, there are seven areas of TVET standard being listed which is; programme development and delivery, assessment of students' learning, student selection and support services, teaching staff, educational resources, program management and program monitoring, review and continual improvement (Malaysian Qualification Agency, 2019). In line with its vision and mission, Jabatan Pendidikan Politeknik & Komuniti Komuniti (JPPKK) has published TVET 4.0 Framework outlines to contribute directly to the sustainability of development in the current education sector, where TVET graduates will be future leaders and industry players in their related fields (Jabatan Pendidikan Politeknik & Komuniti, Oktober 2018; Aziz, Musa & Rashid, 2019).

Studies related to sustainable development in the context of education in Malaysia are widely published (Mahat et al., 2019; Omar et al., 2019; Raman & Abu Bakar, 2019; Retno et al., 2019). As a part of sustainable development, sustainable consumption and production (SCP) playing the vital role to ensure food security of the urbanized world (Knorr et al., 2020). SCP as discussed in Oslo Symposium is the improvement of products or services to improve the quality of life by minimizing the use of natural resources and toxic materials, while reducing waste and pollution risk, to ensure the needs of future generations (Ofstad et al., 1994). It should be safe and beneficial to employees and the consumer community as well as benefit the entire cycle involved (Ali & Suleiman, 2016; Tseng & Divinagracia, 2009). In the context of food, food processing is done to prolong the shelf life of food, optimize the nutrition and quality of food as well as reduce food spoilage and waste (Augustin et al., 2016). Processing can also reduce food waste due to damage, loss of freshness and quality by extending the shelf life (Martindale & Schiebel, 2017).

Meanwhile Alders et al., (2018) reported that the current food system is facing major problem which will give severe impact on human well-being during the Food Security Workshop in Sydney. Therefore, the members of the workshop agree to adopt the sustainability of the food system to ensure the food security being address accordingly. The food processing activities require deep attention from authority and educators to investigate the sustainability along the programme that being offered (Reza, 2016) and should be include in TVET fields. However, the adaptation of the sustainability in the current education and curricular are still far behind the requirement all over the world (Etse & Ingley, 2015; Paryono, 2017; Chin et al., 2019).

The threat of food security discussed above require for changes of food system to a more ethical, safe and nutritious processing from individually or by the authorities (Alders et al., 2018). The issue of food in terms of its intake and processing, requires a change including changes in food processing from the aspect of its effectiveness unit, starting from the food produced (Garnett, 2013). Statement by Alders et al. (2018) and Garnett (2013) illustrate that, existing food processing areas have sustainability issues that need to be addressed. An irresponsible sustainability practices (Taufique et al., 2016) as well as lack of planning and management of food processing are major problems of waste generation as expressed through expert views in a study by Aschemann (2015). This current study offers a new contribution in critical sustainable food processing practices aspects, which have huge results in the industry but limited in TVET and education. The need for training to improve

knowledge, attitudes and practices of food waste management and its reduction rate is very much needed in the field of food processing (Okumus, 2019; Gunders & Bloom, 2017: Gössling et al., 2011).

Therefore, this study is to investigate the predictive factor towards the sustainable food processing practices among the TVET student as they are less competent in the technical skills required by the industry (Rus et.al 2015). The predictive factors suggested are knowledge, awareness, attitude, subjective norm, perceived behavioural control and personal norm. The relationship between knowledge, attitudes and practices is discussed in Theory of Planned Behaviour (TPB) by Icek Ajzen (1991) which also include that the belief that a person who thinks they have a high chance and resource to perform the related action the higher the behaviour control action within themselves on that behaviour (Madden, Ellen & Ajzen, 1992).

Introduced by Ramsey and Rickson, (1976), study on behaviour seem very important for sustainable development, as several studies have been conducted using the Knowledge Attitude and Practices Model(Besar et al., 2013; Ahmad et al., 2011; Derahim., 2011 & Salas-Zapata et al., 2018). However, some research argued that practices not necessarily influenced by knowledge and attitudes, there are other factors that need to be considered (Kollmuss & Agyemen, 2002). Some research mentioned that only attitudes have a significant influence on individual practices (Sayuti, 2020), while knowledge does not affect individuals to behave unless they need to be implemented at the appropriate time, subject to subjective norms and their environment (Greyson & Johnson, 2016).

Futhermore, according to Hungerford and Volk (1990) in Model of Predictors of Environmental Behaviour (PEB), having knowledge of an environmental issue, will not have a positive impact on behaviour that is responsible for sustainability as a whole. There are various internal and external factors that influence the practice of responsibility for sustainability, including barriers, social stress and the opportunity to choose different actions that can restrict or influence a person to act (Ruolin & Nicolette, 2020 & Ungerer, 2015). According to Kollmuss and Agyeman (2002), the practice of sustainability can only be done when it is normalized to become a habit through their experiences that lead to environmental sustainability, which will also affect the subjective norms, perceived behavioural control as well as the personal norms of the individual. In addition, fostering attitude and effectiveness of awareness also has a significant impact on pro-environmental behaviour (Ramly et al., 2012).

Therefore, this study is to investigate an empirical verification of the construct validity and reliability of the questionnaire for sustainable food processing practices in community college. The results of these findings can be a guideline and suggestions for the start of a new curriculum design that applies the concept of sustainability. Without an education for sustainable development, it is difficult to make Malaysia a country that is moving towards sustainable development. The need to determine the sustainability of food processing practices is seen as very significant because studies on it are still limited (Ali & Suleiman, 2016).

Accordingly, the objectives of this paper are: (1) To determine the construct validity of sustainable food processing practices by using Exploratory Factor Analysis; and (2) To

obtain the reliability of i-KProM questionnaires. The i-KProM items, methodology, data analysis, findings and conclusion will be discussed to achieve the objectives of this paper.

Methodology

This study takes place in community colleges in Perak with a population of 808 students.The related community colleges selected due to higher numbers of students to fulfilled the requirement of exploratory factor analysis with the minimum five times of the variables involved in any study (Pallant, 2016). There are 104 completed questionnaires received from students enrolled for Certificate of Food Processing and Quality Control from the selected community colleges which have been approved by *Jabatan Pendidikan Politeknik dan Kolej Komuniti* as the sampling plan for this research.

The i-KProM is an instrument which analysed the content validity and reliability during the pre-test study. This i-KProM is suitable to be used to measure predictive factors for sustainable food processing practices among the TVET students in community colleges (Nasir, 2020). However, due to the large number of variables and items have been developed, this study is aimed to explore the interrelationship among the set of variables which mean to investigate any variables in the set form coherent subsets that are relatively independent of one another (Tabachnick & Fidell, 2013).

Data collection had been administered using *Google* forms that specify each item must be answered to allow respondents to complete the given questionnaire. This online questionnaire is more effective and facilitates data management (Wahyudi, Warijan & Suyanta, 2020). Although there are some studies finding that the response rate for online surveys is low (Fincham, 2008; Sitzia & Wood, 1998), but the ability of respondents to answer the questionnaire in their own time can guarantee a higher response rate than conventional methods (Ball, 2019 and Callegaro et al., 2015) especially as this study was administered during the covid-19 pandemic situation.

Tuten (2010) has listed several advantages of conducting online research among them are; the work for data transcription is easier because all the data is recorded electronically, the response to the questionnaires will be more detailed and clear than by survey using printed forms. Even surveys involving practices and attitudes will be more accurate because respondents are more honest in the responses given due to their awareness of not being recognized if answering questionnaires online (Tuten, 2010).

The i-KProM was developed using the Good Manufacturing Practices code guided by Ministry of Health Malaysia. The questionnaire consist of 4 section, A: demographic chacacteristic, B: sustainable food processing practices C: predictive factor (knowledge=28 items) and D: other predictive factors (awareness=10 items, attitude= 15 items, subjective norm= 4 items, perceived behavioural control= 7 items and personal norm= 4 items).

Section A consisted of three personal information (gender, community college and semester) where respondent must choose any characteristic that represent themselves. The second part consisted of 37 items regarding the frequency of sustainable food processing practices with the likert scale 1= Never; 2= Seldom; 3= Sometimes; 4=Often; 5= Very often. The third section consisted of knowledge item for predictive factor variables with likert scale

1=True; 2= False. However, this section was not included in this study as the scale using are not comply with factor analysis requirement. Section D consisted of five likert scale which represented as 1= Very Disagree, 2= Disagree, 3= Fairly Disagree, 4= Agree and 5= Strongly agree. The respondent needs to choose which scale represent their agreement toward the statement provided.

The main objective of this study is to determine the construct validity for sustainable food processing and the correctness of the items and the inner structure of the construct measure of the instrument. To obtain the idea of this study, Exploratory Factor Analysis (EFA) was conducted to examine the structure of the scale for construct validity and followed by the reliability analysis to test the reliability of the final questionnaire after the EFA being analysed.

For this purpose, normality tests are performed to obtain the pattern of data distribution. According to Hair et al., (2006), good data is data that has a normal distribution.The data of this study have been analysed using the normality test (kurtosis and skewness) before an EFA being run as recommended by Kline (2005). An application of IBM-SPSS version 26 was used to analysis the test mentioned above.

A construct validity is to determine the constructs of the instrument developed is able to measure what it should be measured, where the accuracy and usability of the built instrument can be inferred into the actual study later (Kline, 2005: Ahmad Hashim, 2004). The construct validity used in this study is a factor analysis procedure on all items in each construct of dependent variables and independent variables. Factor analysis is a statistical technique that allows interested researchers to know the variables that form a subset independently of each other. This means, the combination of variables that correlate with each other, forming a factor that is partially independent of the subset of other variables (Tabachnick & Fidell, 2013). Factor analysis procedures aim to analyze the relationship between multiple variables (Hair et al., 2006). The purpose of the exploratory factor analysis procedure conducted in this study is to determine the position factor of each measurement item (Hair et al., 2006). According to Pett, Lackey and Sullivan (2003) for the purpose of evaluating the validity structure of good internal constructs for a particular population, factor analysis procedures can be performed to identify external variables of the study.

Reliability analysis is to obtain a similar score of the measurement that performed repeatedly using the same instrument to test an item or construct (Cavana, Delahaye & Sekaran, 2001). They also suggested that, there are four methods of measuring reliability, namely test-retest, parallel-form, split-half and internal consistency.

Construct validity using factor analysis procedures can be implemented if the data obtained meet the required statistical assumptions. Pallant (2016) discusses the assumptions that need to be met are: first, the overall sample size should be at least five times the number of variables selected as stated by Tabachnick and Fidell (2013). For the purpose of this study, a total of 10 constructs represented by four sub-constructs for the dependent variables and six independent variables were used.

The second assumption to fulfill in this study is the value of the correlation matrix should exceed 0.30, whereas the value of Bartletts' test of Sphericity should be significant, p <0.05, followed by the Kaiser-Meyer-Olkin (KMO) value should exceed 0.60 which can be obtained in the findings of factor analysis conducted to prove items correlated with each other. Next assumption is, the data obtained need to have linearity because factor analysis is to see the correlation between the variables that are assumed to have a linear relationship. Finally, the value of outliers needs to be considered by the researcher because factor analysis is not suitable for variables that have extreme data where the researcher needs to review the data to determine whether the data needs to be discarded or re-coded. However, there are few opinions suggested that the normality of distributions is not very critical to determine if the researcher needs to explore, summarize and explain the relationship between the variables studied which most likely related to this study (Hair et al., 1995; Pett et al., 2003; and Tabachnick & Fidell, 2013).

Results and Discussion

Validity Analysis Using Exploratory Factor Analysis

Regarding to current study by considering that the above basic assumptions have been met, the following three main steps have been carried out to test the intended factor analysis procedure. Firstly, the sample size was 104 which is ten times compared to the 10 variables selected for this study. The correlation matrix value was determined to have a value greater than 0.30 using the value generated by SPSS, while to assess the factoring data, Bartlett's test of sphericity was significant (p <.05) at 0.01, as well as Kaiser-Meyer-Olkin (KMO) is 0.70 where, according to Tabachnick & Fidell (2001) values above 0.6 are the minimum values for conducting good factor analysis.

The second step is to obtain the smallest number of factors to represent the selected variables to explain the variance values of the original data set. (Pallant, 2016). Therefore, the researcher had explored with a number of different factors to obtain the most appropriate number of factors in this study as suggested by Tabachnick & Fidell (2013). The determination to select the number of factors for this factor analysis is based on three aspects; first, Kaiser's Criterion which is a factor with an eigenvalue value exceeding 2.0 according to the recommendations of Tabachnick & Fidell (2007) will be proposed as a number of factors, secondly by looking at the plot on the Catell scree test (Catell, 1966) where the points before the plot forming an elbow proposed to be the number of factor and thirdly a parallel analysis in which the value of eigenvalue which exceeds the test value of the analysis will be set as the actual number of factors.

The third step in determining factor analysis is to interpret by making rotation through two approaches namely orthogonal or obligue. Since the items for the food sustainability practice construct are items that refer to Good Food Manufacturing Practices, GMP 2018, Ministry of Health Malaysia, then the researcher assumes that the items constructed are independent of each other. Thus, rotation using the orthogonal varimax method is used to determine the total number of factors for this study as suggested by Gorsuch (1983) and supported by Brown (2009).

Sustainable Food Processing Practices

The sustainable food processing practices variable questionnaire consists of 37 items have been analyzed using factor analysis in terms of; (a) acquisition and storage of raw materials, (b) production of products and sanitation, (c) packaging and use of products; and

(d) management of waste disposal. Based on the analysis conducted, the KMO value is 0.67 above 0.60 as suggested and Barlett's test of sphericity (Barlett, 1954) is significant at $p < 0.01$ with the estimated value of Chi-Square 811.665 at degree 253 showing items correlated with each other. Communilities value is above 0.30. The finding above indicates the appropriate data matrix for factor analysis.

Factor analysis through the Varimax rotation procedure, on the Rotated Component Matrix table shows the items of the three-dimensional questionnaire (contains 3 factors). Therefore, Table 1 showed the three factors have been extracted as suggested by Tabachnick & Fidell (2007) which is a factor with an eigenvalue value that exceeds two, is a good factor for a study in addition to the evaluation of the Scree Plot. All three factors predict a total of 41.05 percent variance for the dependent variables of food processing sustainability practices. Examination of the items under each factor with reference to previous studies on the boundaries of sustainable food processing practices proposed by Holden and Yan (2014) that the key aspects in food processing are; processing (12 items), post-processing (6 items) and pre-processing (5 items) for this questionnaire.

Table 1
Summary of EFA for Sustainable Food Processing Practices variables

Item Code		1	2	3
	FACTOR 1 Processing			
AC2	Packing end products using plastic wrap.	.799		
AC4	Provide end products to others if excessive.	.687		
AC6	Store the product in a recyclable container (recycle).	.649		
AB15	Wash used aprons / labcoats.	.609		
AB8	Use the same wipes cloth to wipe tables and utensils.	.606		
AB16	Wipe the equipment with a rag after lab activities.	.588		
AC3	Put the product into the container / packaging immediately after processing.	.570		
AD7	Cut the fruit as much as possible to reduce the waste to be discarded.	.556		
AD8	Cleaning the worktable after food processing activities.	.509		
AB5	Wear a mask during food processing activities.	.479		
AD1	Separate the waste before throwing it in the trash.	.429		
AB13	Wear a hat (Male / Non-Muslim) or hijab (Female) during food processing activities.	.425		
	FAKTOR 2 Post-processing			
AD3	Dispose of glass trash in a brown trash can.		.776	
AA6	Store the raw material in a container with an expiration date.		.660	
AA5	Store food grade chemicals in the same place as dry raw materials.		.651	
AD5	Collect practical waste to make organic fertilizer. (examples: eggshells, fruit skins)		.623	
AB1	Discard raw materials if weighed incorrectly. *		.599	
AD4	Throw paper type trash into a blue trash can.		-.514	
	FAKTOR 3 Pre-processing			
AB14	Wear accessories (watches / jewelry) during food processing activities.			.700
AA3	Separate cold raw materials (chill) and frozen raw materials (frozen) during storage.			.675
AC5	Place end products on the floor before stacking on shelves.			.611
AB9	Do not mind using slightly dented canned raw materials.			.503
AC1	Steaming glass bottles for sterilization of chili sauce bottles.			.456

	Eigenvalues	7.337	3.574 3.140
	Varians Percentage	19.831	9.660 8.485
	KMO	.694	
	BTOS Test	1765.06	
	df	666	
	Sig.	.000	

The results of the analysis also show that there are 12 items that overlap the concept where those items were removed for the purpose of this study.

Awareness

The independents variables for awareness consisted 10 items and the test results found that the KMO value was 0.92, exceeding the set value of 0.6 and the value of Barlett's test of sphericity (Barlett, 1954) was significant at p <0.01 with an estimated value of Chi-Square 636.81 at degree 45 shows the items in these variables correlated with each other. In addition, the value of communilities is more than 0.3. The MSA (Measure of Sampling Adequacy) value for items individually ranging from 0.39-0.72 also indicates appropriate for factor analysis. Factor analysis only produces one factor which is awareness. The factor load for the item in this factor is between 0.624 to 0.846. The overall variance contribution value was 59.75 percent with the eigenvalues value of 5.98. The results of the observations in the anti-image matrix correlation suggest that all factors have a sufficient load, so no factor is dropped. Table Table 2 below shows the summary of factor analysis conducted.

Table 2
Summary of EFA for Independent Variables Awareness

Code	Item	Factor Loading
FK1	Quality products are a necessity for every household.	.725
	Good storage can guarantee the supply and quality of food products.	.727
FK3	I need to produce nutritious products that guarantee the country's food supply.	.788
FK4	Packaging can facilitate the distribution of food supplies nationwide.	.842
FK5	I need to replace existing food processing methods, to increase food productivity.	.717
FK6	Food management and food processing techniques are important for food supply assurance.	.837
FK7	I need to be prepared to participate in food safety certification program (MESTI).	.789
FK8	Climate change affects food security.	.624
FK9	I need to participate in activities that contribute to food security.	.846
FK10	Sustainable food processing is able to guarantee food supply.	.805
Eigenvalues		5.975
Varians Percentage		59.750
KMO		.920
BTOS Test		636.808
df		45
Sig.		.000

Attitude

The measurement scale for the attitude variables contained 15 questionnaire items before 2 items were dropped because they had a value of communilities <0.3. The test results found that the KMO value was 0.88, exceeding the set value of 0.6 and the value of Barlett's test of sphericity (Barlett, 1954) was significant at p <0.01 with the estimated value of Chi-Square 804.38 at degree 105 indicating items in this variable correlate with each other. In addition, the value of communilities gives a value of more than 0.3. The MSA (Measure of Sampling Adequacy) value for individual items ranges from 0.36-0.66 also indicates suitablity for factor analysis. Factor analysis only produces one factor which is attitude. The factor load for the item in this factor is between 0.62 to 0.81. The overall variance contribution value is 48.00 percent with the eigenvalues value of 7.20. The results of observations in the anti-image matrix correlation suggest that two items do not have sufficient load, so the dropped they have been dropped.

The factor analysis of the validity of the content of the items carried out on the construct of attitude variables and test results is as shown in Table 3 below.

Table 3

Summary of EFA for Independent Variables Attitude

Kod	Item	Factor Loading
FS1	I think buying local raw materials supports the concept of sustainability as opposed to giving imported goods.	0.766
FS2	I think storing products by category is a sustainable food processing practice.	0.807
FS4	I think labels on raw materials provide information on how to use the product efficiently.	0.623
FS5	I think using the right temperature while processing can save energy (gas and electricity).	0.611
FS6	I think using machines and tools with the right functions can make the job easier.	0.726
FS7	I think properly measured food additives ensure the sustainability of food processing.	0.740
FS8	I think, every college should provide space to sell products.	0.705
FS10	I think products that are often not used up should be reduced production.	0.745
FS11	I believe, everyone wants to take advantage of their products through consumer sustainability education.	0.776
FS12	I think managing waste well, can reduce solid waste.	0.792
FS13	I feel upset if I have to throw away food.	0.704
FS14	I think solid waste segregation facilitates cleaning work.	0.760
FS15	I believe, food waste made into organic fertilizer is a good practice.	0.709
Eigenvalues		7.199
Varians Percentage		47.991
KMO		.884
BTOS Test		804.379
df		105
Sig.		.000

Subjective Norm

The measurement scale for the subjective norm variable consisted of 4 items and the test results found that the KMO value was 0.777, exceeding the set value of 0.6 and Barlett's test of sphericity (Barlett, 1954) was significant at p <0.01 with an estimated Chi-Square value of 175,595 at 6 degree shows that the items in this variable are correlated with each other. In addition, the value of communilities gives a value of more than 0.3. The MSA value for individual items ranged from 0.525-0.749 also indicates suitability for factor analysis. Factor analysis only produces one factor which is subjective norm. The factor load for the item in this factor is between 0.725 to 0.865. The overall variance contribution value was 68.03 percent with the eigenvalues value of 2.72. The results of the observations in the anti-image matrix correlation suggest that all factors have sufficient load, therefore no factors are dropped as detailed in Table 4 below.

Table 4
Summary of EFA for Independent Variables Subjective Norm

Code	Item	Factor Loading
FNS1	My friend encourages the storage of raw materials according to the category / type of material.	.865
FNS2	Lecturers / Employers encourage the storage of raw materials with the concept of First In, First Out (FIFO).	.836
FNS3	All my friends want me to wear aprons, headgear and bring rug cloth during processing practical.	.725
FNS4	The lecturer insisted that I adhere to Good Manufacturing Practices (GMP) such as always washing my hands and keeping my nails short and clean.	.865
Eigenvalues		2.721
Varians Percentage		68.030
KMO		.913
BTOS Test		175.595
df		6
Sig.		.000

Perceived Behavioural Control

The measurement scale for the perceived behavioural control variable consisted of 7 items before the one item was dropped because it had a communilities <0.3. After conducting re-analysis, the test results found that the KMO value of 6 items was 0.874, exceeding the set value of 0.6 and Barlett's test of sphericity (Barlett, 1954) was significant at p <0.01 with an estimated value of Chi-Square 263.963 at degree 15 shows the items in these variables correlated with each other. In addition, the communilities value gives a value of more than 0.3. The MSA value for individual items ranging from 0.881-0.901 also indicates suitable for factor analysis. Factor analysis produced only one factor, namely the behavioural perception perception factor. The factor load for the item in this factor is between 0.682 to 0.868. The total variance contribution value is 60.121 percent with a value of eigenvalues of 3,607. Therefore, a total of 6 items were used for the perceived behavioural control factor towards further study as detailed in Table 5 below.

Table 5
Summary of EFA for Independent Variables Perceived Behavioural Control

Code	Item	Factor Loading
FPK1	Lack of emphasis on good raw material storage causes its implementation to be ineffective.	.682
FPK2	Hygiene and sanitation practices in food processing can be done well, when all the equipment and facilities are available to everyone.	.868
FPK3	The practical time given is sufficient to ensure the cleanliness of the equipment and workspace is well made.	.792
FPK4	The problem of clogged pipes, inadequate sinks complicates food processing waste management practices.	.752
FPK5	I need to produce a clean and safe product if I have to bear the consequences of food poisoning produced.	.726
FPK7	Cleanliness of equipment and workplace, can be maintained through the cooperation of everyone.	.819
Eigenvalues		3.607
Varians Percentage		60.121
KMO		.874
BTOS Test		263.963
df		15
Sig.		.000

Personal Norm

The measurement scale for the personal norm variable contained 4 items of questionnaire before the FNP2 item was dropped because it had a uniformity value (Communilities) <0.3. After conducting re-analysis, the test results found that the KMO value of 3 items is 0.633 above the set value of 0.6 and Barlett's test of sphericity (Barlett, 1954) is significant at p <0.01 with an estimated value of Chi-Square 65.92 at degree 6 shows the items in this variable are correlated with each other. In addition, the value of uniformity (Communilities) gives a value of more than 0.3. The MSA (Measure of Sampling Adequacy) value for individual items ranging from 0.45-73 also indicates suitable for factor analysis. Factor analysis only produces one factor which is personal norms. The factor load for the item in this factor is between 0.545 to 0.705. The overall variance contribution value is 49.386 percent with the eigenvalues value of 1,975 as shown in Table 3.110 below. Therefore, a total of 3 items was used for the personal norm factor against the actual study. Table 3.21 below shows the summary of factor analysis for personal norm variables.

Table 6
Summary of EFA for Independent Variables Personal Norm

Code	Item	Factor Loading
FNP1	I feel guilty if the end product is not good quality because I did not follow the proper practical method.	.667
FNP3	I care about storing chilled raw materials because they are easily damaged.	.743
FNP4	If I value food hygiene, I also value the safety and sustainability of the general public.	.855
Eigenvalues		1.975
Varians Percentage		49.386
KMO		.633
BTOS Test		65.922
df		6
Sig		.001

Reliability Analysis

The current study was using a measurement of internal consistency to determine the reliability coefficient known as Cronbach Alpha for each construct and the entire evaluation instrument through Statistical Package for Social Science (SPSS) version 26.0 software. Cronbach Alpha statistics are calculated from a range of 0 to 1 where the value approaching 1 indicates that the items in the questionnaire have a positive correlation with each other and have a high internal consistency. Cronbach Alpha values less than 0.6 are considered weak and unsatisfactory while values above 0.6 are acceptable or reliable. However, values above 0.8 are considered better (Cavana, Delahaye & Sekaran, 2001; Hair et. Al., 2007). Jackson (2006) suggested the scale acceptability is 0.00- 0.29= Weak; 0.30- 0.69= Moderate and 0.70-1.00= Strong. The result for reliability test for this study show in Table 7 below;

Table 7
Cronbach's Alpha for Each Criteria and Features of the i-KProM Questionnaire

	Variables	(Number of Item) Alpha Value	Interpretation
Sustainable Food Processing Practices (After Factor Analysis)		0.73	Strong
i.	Processing	(12) 0.81	Strong
ii.	Post-processing	(6) 0.50	Moderate
iii.	Pre-processing	(5) 0.57	Moderate
Predictive Factors			
i.	Knowledge	(28) 0.75	Strong
ii.	Awareness	(10) 0.92	Strong
iii.	Attitude	(13) 0.93	Strong
iv.	Subjective Norm	(4) 0.83	Strong
v.	Perceived Behavioural Control	(6) 0.86	Strong
vi.	Personal Norm	(3) 0.66	Moderate

(Jackson, 2006)

Conclusion and Recommendation

The i-KProM have been chosen to determine the sustainable food processing practices among the TVET students. This study is significant for the future of sustainable food production and consumption (SDG 2030). The validity and reliability aspects of the i-KProM were proven and being used to measure the adequacy of the sustainable food processing instrument.

There are six succeeded criteria of the i-KProM for sustainable food processing which is all criteria produce moderate to high reliability Cronbach alpha, α>0.50 to 0.93. The result of EFA for sustainable food processing practices remained 23 items that contribute to three factors which is; processing (12 items), post-processing (6 items) and pra-processing (5 items). The predictive factor variables consisted of 23 items which is; awareness (10 items), attitude (13 items), subjective norm (4 items), perceived behavioural control (6 items) and personal norm (3 items). Furthermore, data encompassing this study were suitable to run the EFA based on descriptive analysis.

Most of the research regarding the sustainable food processing only focusing on industrial and household sustainable practices (Ng & Shukor, 2016: Ahamad et al., 2018) and limited articles related to sustainable food processing in TVET. Therefore, this instrument (i-KProM) gives an advantage to the policy maker and management of TVET to review their curricular also policy regarding this issue which can contribute to educate our future sustainable practitioner in the food processing field.

Acknowledgement

This paper is a part of dissertation sponsored by Ministry of Higher Education Scholarship Programme.

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